

# GESPER SYSTEMS

## TECHNICAL OVERVIEW



In the United States an estimated 60-65% of electrical energy is used to supply motors. 75% of electrical energy supplies variable torque fan, pump and compressor loads. 18% of energy used in the 40 million motors in the U.S. would benefit from efficient energy improvement technologies such as VFDs.

VFD (Variable Frequency Drive) and VVFD (Variable Voltage Frequency Drive) lower the consumption of electricity. However, VFD's produce additional harmonics that remain within the electrical system.

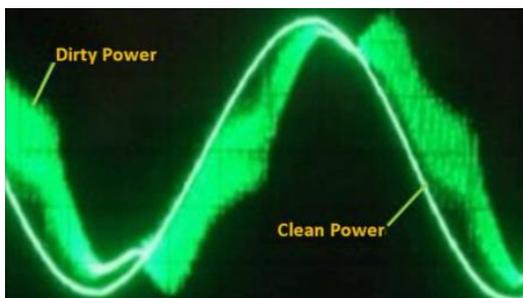
### THE TEXAS TECH TEST

We performed a comprehensive test at Texas Tech University using a 100 hp air handler unit that had a VVFD installed. They had reduced their KW down from 22 to 10.5 - 12.0 KW. After installing GESPER SYSTEMS on the line side of the disconnect feeding the VVFD, we reduced KW consumption to 5.0 - 7.5KW. Measurements were analyzed using TexasTech University's Dranetz.



- Texas Tech University performed all monitoring and analysis.

We added GESPER SYSTEMS to many VFD's in other manufacturing facilities and have helped energy savings on all applications. GESPER SYSTEMS works on entirely different aspects of electricity that goes to motors than what a VFD/VVFD does.



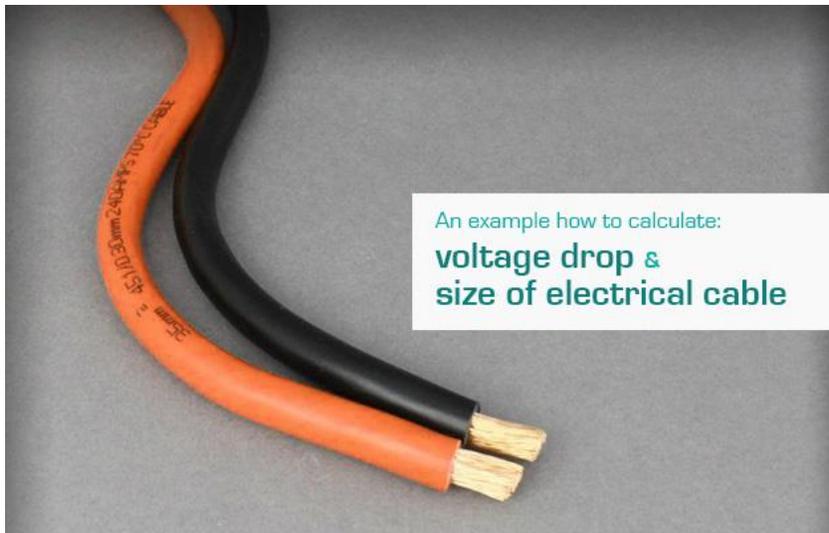
A variable frequency drive (VFD) is a system for controlling the rotational speed of an alternating current (AC) electric motor by controlling the frequency of the electrical power supplied to the motor.

GESPER SYSTEMS maintains the Hz cycle and 1) does not produce harmonics and 2) helps lower wasteful energy produced by creating harmonics.

VFD frequency drive controllers are solid state electronic power conversion devices. Their design first converts AC input power to a DC intermediate power using a rectifier bridge. The DC intermediate power is then converted to a quasi-sinusoidal AC power using an inverter switching circuit. GESPER SYSTEMS does not convert AC to DC using a rectifier bridge and then convert it back to AC. When converting from AC to DC, harmonics are produced. With the filters in GESPER SYSTEMS, we are able to filter out harmful harmonics that make motors work less efficiently or harm other electronic loads.

AC motor characteristics require the applied voltage to be proportionally adjusted whenever the frequency is changed. For example, if a motor is designed to operate at 460 volts at 60 Hz, the applied voltage must be reduced to 230- volts when the frequency is reduced to 30 Hz. GESPER SYSTEMS maintains and stabilizes the voltage and Hz to produce a continuous steady supply of power on the Line Side of the Disconnect going to the VVFD/VFD.

- *The VVFD/VFD use GESPER SYSTEMS stable supply of power to result in better performance.*



CABLE LENGTH - Another application that constricts VFD's is cable length. At 460 volts, the maximum recommended cable distances between VFD's and motors can vary by a factor of 2.5:1. Longer cable distances are allowed at lower Carrier Switching Frequencies of 2.5 KHz. The lower Carrier Switching Frequencies can produce audible noise at the motors. Shorter cables are allowed at the higher Carrier Switching Frequencies of 20 KHz.

GESPER SYSTEMS has been proven to prevent Line Loss over greater distances between the main power and the motor. This is in exact opposite of what VFD's do.

When a VFD starts a motor, it initially applies a low frequency and voltage to the motor. The starting frequency is typically 2 Hz or less. Starting at such a low frequency avoids the high in-rush current that occurs when a motor is started by simply applying the utility voltage by turning on a switch. When the VFD starts, the applied frequency and voltage are increased at a controlled rate or ramped up to accelerate the load without drawing excessive current. This starting method typically allows a motor to develop 150% of its rated torque while drawing only 50% of its rated current.

GESPER SYSTEMS allows the motor to have 100% of the voltage and current, yet with its internal proprietary parts, the motor does not have the in-rush of power as usual. This is achieved without changing the torque. The demand of in-rush is eliminated without any electronics controlling the voltage or Hz. Supplying a "more pure" form of clean power, the VFD's have an easier time of controlling the voltage and Hz. Thus, GESPER SYSTEMS helps VVFD/VFD do their job more efficiently and helps them maintain their quasi-sinusoidal output waveform over a longer distance.